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PAGE	NO	1	

		PAGE NO
SEC.		9 TWP. 2S RGE 97W
FARMM	ilo Love	e No. 2 Core Hole
. /		il & Refining STATE Colorado BOX NO
Como		
RXXDIXER I	ROM	EXAMINED BY W. W. Sloan
LOCATION	147½ due	e SW of #1 Core Hole ELEVATION KB 6133 . LOAN SET
FROM	то	FORMATION AND REMARKS
		Core #1 584-614 Cut 30' - Rec 28'
584	590	Oil shale fair to good - fissile - slightly wavy but with regular bedding.
590	593	Oil shale fair to good - very hard, some conchoidal fracture, fractured at random angles.
593	594	Core loss.
594 594	594 • 5 597	Oil shale good, brecciated. Oil shale, fair to good, very hard, conchoidal fracturing, random fractures.
597	598	Oil shale good to very good, wavy bedding, badly broken.
598 599	599 607	Core loss. Oil shale, fair to good, with interbeds of siltstone and mudstone -
		poker chip recovery.
607	612	Oil shale fair to poor with interbeds of siltstone and mudstone - regulable bedding.
612	612.5	ACCOMPANIES - STORY RECOVERED AND CONTRACTOR
612.5	614	Oil shale good, fissile, thin bedded - slightly wavy bedding with numerous small inclusions on mudstone (or altered nahcolite?).
		Core #2
		644-674 Cut 30° - Rec 30°
644	654	Oil shale, good to very good, regular bedding, hard. Occasional small inclusion of nahcolite(?) - vertical fracture 648.2 to 650.6.
654	656	Oil shale as above, erratic bedding - appears to be wrapping around
656 663.3	663 <b>.</b> 3 674	large inclusion of nahcolite. Oil shale, very good to excellent - regular bedding, no fracturing. Oil shale, good, very hard, regular bedding, fractured. 60° fracture from 663.3-665. 80° to vertical 665-674 - closed 60° fracture 665.3 to 666.
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		2	
PAGE	NO		

SEC.		9 TWP 2S RGF 97W						
M.	ilo Love	NO 2 Core Hole						
		No.						
	umble Oi	1 & Refiningstate Colorado						
Core	ROM	examined by W. W. Sloan						
LOCATION	147½ du	e SW of #1 Core Hole ELEVATION KB 6133 LOAN SET						
FROM	то	. FORMATION AND REMARKS						
		Core #3 957-987 Cut 30° - Rec 30°						
957 958•5	958 <b>.</b> 5 960	Oil shale, good to very good, varved, regular.  Mudstone, gray, flecked and veined with white mineral (nahcolite?), no apparent bedding, soft.						
960	968.5	Mudstone, gray brown, vugular (pinpoint to pea size) interbeds and inclusions of gray shale, flecked and veined with white mineral as above						
968.5	978	Shale, gray to gray brown with inclusions or interbeds of gray mudstone vugs from pinpoint to walnut size - flecked with white mineral (as above						
978	984.7	wavy bedding. Reddish brown band from 979.7 to 979.8.  Mudstone, gray to gray brown with inclusions and interbeds of gray shale						
984.7	987	pinpoint vugular porosity flecked with white mineral as above. Mudstone, gray, no bedding, heavily flecked with white mineral as above, soft and crumbly.  (Bubbling gas throughout.)						
		Core #4 1062-1092 Cut 30' - Rec 28'						
1062	68.6	Shale, gray and gray brown with interbeds and inclusions of mudstone						
1068.6	1070.5	with pinpoint porosity. Oil shale inclusion, brecciated with numerous vugs, pea to walnut size. Mudstone, gray, with a few interbeds of gray and brown shale - numerous vugs, pinpoint to pea size.						
1074	1080	Oil shale, good, brecciated with approximately 20 walnut to fist size						
1080 1081 1082 1083•5 1085 1086	1081 1082 1083.5 1085 1086 1092	vugs. Shale, gray, gray green and brown, badly broken. Core loss. Shale, gray, etc., as above. Oil shale, breccia, numerous walnut size vugs. Core loss. Shale, gray and gray brown with interbeds of mudstone and oil shale breccia, numerous pea to walnut size vugs.						

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PAGE	NO.	2	

SEC	9	TWP. 2S RGE 97W
FARM	Milo L	ove 2 Core Hole
OWNER	Humble	Cil & Refining STATE Colorado BOX NO.
Core	FROM	examined by W. W. Sloan
LOCATION	147½ di	ue SW of #1 Core Hole ELEVATION KB 6133 LOAN SET
FROM	то	. FORMATION AND REMARKS
		Core #5 1105-1212 Cut 27' - Rec 25'
1185	1190.8	walnut to fist size, bedding fairly indistinct and irregular, core
1190.8	1192	very firm. Interbedded mudstone and poor to good oil shale, rotten, very vugular
1192	1194	with some vugs in form of horizontal slots. Core Loss.
1194	1200	Oil shale, poor to fair with walnut to fist size vugs and inclusions of nancolite - fair to good bedding.
1200	1212	Oil shale, fair to good, very finely bedded, firm, with a few fist size vugs.
		Core #6 1680-1710 Cut 30' - Rec 30'
1680 1681	1681 1692	Oil shale, good.
		Oil shale, fair to good with interbeds gray and brown shale (1" band of white mineral at 1687, analcite?).
1692	1697	Oil snale, poor to fair, with interbeds gray and brown shale (vugular openings in vertical fracture 1693.2-1964.2).
1697 1706.4	1706.4 1710	Oil shale, fair to good, with interbeds of gray and brown shale. Nahcolite, granular, bedded with interbeds of good oil shale. (Best visual correlation point.)
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	PAGE NO	·	4	 
	97W			
i Samuel				
m	chalo			

SEC		9 TWP. 2S RGE 97W
FARM	Milo Lo	ve 2 Core Hole
OWNER Core		Dil & Refining STATE Colorado BOX NO.  EXAMINED BY W. W. Sloan
LOCATION	147½ du	Le SW of #1 Core Hole ELEVATION KB 6133 LOAN SET
FROM	то -	FORMATION AND REMARKS
Management and administrative and an		Core #7 1740-1770 Cut 30° - Rec 30°
1740 1741 1752 1756	1741 1752 .1756 1770	Shale, gray and brown.  Oil shale, fair to good - fine regular bedding.  Oil shale, poor to fair with interbeds of gray and brown shale.  Oil shale, fair to good with interbeds of gray and brown shale.  (Gassy odor throughout.)
1965	1995	Core #8 1965-1995 Cut 30' - Rec 30'  Oil shale, fair to good with a few thin (1" or less) interbeds of tan mudstone. (Open vertical fracture 1972.8-1973.2.) Good regular bedding. (Gassy odor.)

PAGE	NO	1	

SEC		9	TWP	2S	RGE	97W
FARM		Milo Love		NO	#2 Core Hole	
OWNER_H	umble	Oil & Refining Co	STATE	Colorado	BOX NO	
SAMPLES F	ROM		EXAMINED BY	W. W. Sloa	n	
LOCATION	1471/2	due SW of #1 Core	Hole -	KB KB	6133	N SET
FROM	то		L		AND REMARKS	I SEI
		Rathole to 200	' - sampl	es are from	ditch.	
0 5	5 .25	siltstone.	with frag	ments and pe		gray shale and tan
25	70	Clay, silty, w		ked siltston	e, tan shale, gr	ay shale, and some
	70	Drilling time :	indicates	top of soli	d formation.	
70 80 95 110 120 145 165 175 185	80 95 110 120 140 145 165 175 185 190	Siltstone, card Siltstone, card First abundant	een with carbona carbona cove with rved in proposed with conaceous conaceous conaceous cil shal	tan siltstone ceous, micace ceous, micace tan shale - art, fissile, with tan state of trace of trace oil state in samples	e. eous. eous, sandy. occ varves. nale. varved oil shale	
200 205 215 245 250	200 205 215 245 250 310	Surface pipe se Siltstone, card Oil shale, fain Siltstone, tan, Shale, tan, van	et at 195 conaceous r to good , carb, w rved, with	- shaker con, tan shale, fissile, which tan shale hean oil si	trace poor oil ith tan sh and s and occ stks poor and sltst.	sh.
	310	Top of Parachut	te Creek	member.		
310 350 355 360 365 390 395 400 405 410	350 355 360 365 390 395 400 405 410 415	Oil shale, fiss Oil shale, fair Oil shale, good Oil shale, fair Oil shale, fair	sile, var to good to very to good to good carb st to very to good	ved, good to good. , tr mudst. ks and oil si good.	n, fair to good.	

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PAGE	NO.	2	

SEC		9 TWP	28	RGE	97W
FARM		Milo Love	No2 Cor	e Hole	
OWNER_H	umble Oi	ll & Refining Co. STATE	Colorado	BOX NO	
SAMPLES F	ROM	EXAMINED	BY W. W. Sloan		
		ae SW of #1 Core Hole		6133 LOAN SET	
FROM	то	•	FORMATION AND	REMARKS	
415	420	Oil shale, fair to go	od.		
420	425	Oil shale, good to ve			
425	515	Oil shale, fair to go		mudst.	
515	525	Oil shale, fair to go	od, with brownish	tan slist flecke	ad W/carh mat
525	530	Oil shale, poor to go			w/ carb mat.
530	550	Oil shale, fair to go		aab v •	
Cir.samp.	550	Oil shale, as above w			
		,	, va maabee		
		Ran logs.			
550	555	Oil shale, good, hard	. conch frac.		
555 .	560	Oil shale, good, fiss		ē1	
560	575	Oil shale, good to ve			
575	580	Oil shale, good, w/so			
580 -	584	Oil shale, very good,		udst.	
584	614	Core #1.	w/ Intersection of m	4450	
614	615	Oil shale, poor to fa	ir w/mudst.		
615	620	Oil shale, good to ve		erous interheds o	of cream mudet
620	625	Oil shale, fair w/mud		crous inverseus (	or cream madst.
625	-630	Oil snale, fair to go			
630	635	Oil shale, fair w/muq	10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
635	.640	Oil shale, fair w/mud		m eltet (analcite	22)
640	644	Oil shale, good to ve			/ •
644	674	Core #2.	ry good w/ bome ra.	II Interpeus.	
674	680	Oil shale, very good,	fissile black		
680	695	Oil shale, as above w	/some mudet		
695	700	Uil shale, as above w		n of nahoolita	
700	705	Oil shale, good to ve		I OI HAMCOLLCE.	
705	710	Oil shale, very good,	• •	n to black	
710	715	Oil shale, good to ve	0		enthy ennougence
715	720	Oil shale, fair w/mud			0 11
720	725	Oil shale, good, dark	-	c min carcite of	bedded Hancollie(:)
725	735	Oil shale, good to ve		and hile	
735	745	Oil shale, fair to go		and bik.	
745	750	As above w/abd mudst.	34.		
			ad ab		
750 755	755	Mudstone w/some fair		+	
755	760	Oil shale, fair to go		ter.	
760	775	Oil shale, as above w			
775	700	Oil shale, poor to fa			
780	705	Oil shale, mudst, mar.		breccia.	
785	790	Oil shale, poor to far		The same production of the same	No. of the contract of the con
790	003	Oil shale, poor to far marist and a trace of		y mudst pyrite, a	and gray and white

Oil shale, good to very good.

Oil shale, fair to good w/gray green sh and mudst.

As above (samp heavily contaminated by salt being added to mud).

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AGE	NO	1	

							PAGE NO	
SEC	9	TWP	25		RGE		97W	-
FARM	Milo Love			2 Core	Hole			-
OWNER Humble	e Oil & Refin	ing Co. STATE	Co	lorado	BOX NO			
SAMPLES FROM_		EXAMINED						
	•	l Core Hole			L	DAN SET	860	
FROM TO		,	FORMA	TION AND RE	MARKS			
000								

Oil shale, poor to fair w/buff mudst, pyritic. Oil shale, fair to good w/mudst and gray and tan fissile shale. Oil shale, good to very good, dk greasy black and brown w/some mudst and fissile gray sh. Oil shale, fair to good, light to med brown w/stks of poor oil sh and some mudst and gray sh. Oil shale, fair w/mudst. Mudstone w/poor to fair oil sh. Oil shale, fair to good w/mudst and trace of gray green sh. Shale, gray green and brown w/good oil sh. Oil shale, fair to good w/some mudst. Mudstone, tan and brown w/some good oil sh. Oil shale, good to very good. Shale, gray and gray green and brown, and some good oil sh and mudst. Oil shale, good w/some sh as above. Shale, gray and brown w/mudst and some good oil sh. Oil shale, good w/gray and brown sh and mudst. Muast w/gray and brown sh. As above w/some fair to good oil sh. Core #3. Mudstone, tan and gray w/sh gray and gray green and brown. 1005 . Snale, dk gray w/sh reddish brown. Some fair oil sh. Oil shale, fair to good w/mudst and gray sh. Mudstone, tan w/oil sh fair to good. Oil shale, fair to good w/tan mudst. Oil shale, poor to fair w/gray sh. Shale, gray, brown and gray green w/oil sh fair. Shale, brown, w/oil sh fair to good (brown, greasy, earthy). Muastone, tan and buff. Shale, gray flecked w/white min and oil shale, fair to good - some of this is papery and rubbery - some amber nahcolite. Shale, choc brown, some greasy, woil sh good and some mudst, trof nahco, amber solid and soft fibrous, honeycomb and vugular por in some pieces - also traces of solid black mineral (gilsonite?). Oil shale, tan to brown, earthy - fair. Oil shale, as above, fair to good w/some mudst. Oil shale, good, brown to dk brown, varved. Oil shale, good to very good, dk greasy brown to black. Oil shale, fair to good w/some gray sn.

\_\_\_\_\_ TWP.\_\_\_\_\_ 2S 97W Milo Love No. \_\_\_\_\_ 2 Core Hole OWNER Humble Oil & Refining Costate Colorado BOX NO. EXAMINED BY W. W. Sloan 1471/2 due SW of #1 Core Hole ELEVATION KB 6133 LOAN SET FROM FORMATION AND REMARKS 1180 1185 Oil shale, good to very good. 1185 1212 Core #5. 1220 1212 Oil shale, fair to good w/some mudst. Tr pyrite and nahco. 1220 1225 Oil shale, good w/some mudst. 1230 1225 Oil snale, good to very good w/some mudst. 1230 1260 Oil shale, fair to good w/gray and brown sh and mudst. 1260 1280 Oil shale, poor to fair w/tan mudst. 1280 1290 Shale, gray w/mudst and fair oil sh. 1290 1300 Oil shale, fair, w/mudst and gray and brown sh. 1320 1300 Oil shale, fair to good, w/some mudst. 1320 1335 Oil shale, good to very good w/ tr nahco. Oil shale(?), choc brown, soft, earthy. 1340 1335 1340 1350 Oil shale, good to very good, dark brown, greasy - tr pyrite, nahco and gilsonite? 1350 1355 Oil shale, good w/some mudst and gray sh, abundant nahco. 1355 1360 Oil shale, good, choc brown w/abd gilsonite. 1360 1365 Oil shale, good, earthy. 1365 1370 Oil shale, fair to good w/mudst and gray sh. 1370 Oil shale, very good, eartny, soft, greasy, w/incl of nanco. 1375 1375 1390 Oil shale, good, fissile, finely bedded, w/a few thin interbeds of gray sh. 1400 1390 Oil shale as above, good to very good, occ intbd gray and tan sh. 1400 1420 Oil shale, good, finely bedded w/tr nahco. 1420 1430 Oil shale as above, good to very good. Oil shale as above w/50% nahco in form of brown honeycomb and 1440 1430 translucent crystals (white to amber). Oil snale, fair w/tan mudst and some nahco. 1440 1455 1455 1465 Oil shale as above, fair to good. 1465 1490 Oil shale as above, good, w/abd nanco. Oil shale, fair to good w/mudst and gray sh. 1490 1500 1500 1515 Oil shale, good, brown to choc brown, greasy. Oil shale, fair to good w/a few intbds of gray and gray green sh. 1515 1555 1555 1560 Shale, gray w/some mudst. 1560 1575 Oil shale, fair to good w/trace nanco. 1575 1610 Oil shale, fair w/trace nahco. Oil snale, poor to fair w/some nahco. 1610 1620 Oil shale, fair w/considerable nahco. 1620 1630 Oil shale, poor to fair w/tr manco and some mudst. 1630 1640 1640 Oil shale, fair w/muast. 1655 Oil shale, poor to fair w/mudst, silty and nahco. 1655 1675 1680 Oil shale, fair to good w/silty mudst. 1675 1680 1710 Core #6.

Oil snale, good to very good w/nahco.

1710

1730

						PAGE NO. 5
SEC		9	TWP	2S	RGE9	97W
FARM	Mil	Love	N	o. 2 Core Ho	le	
OWNER H	umble O	il & kefining Co. s	TATE Colors	aão B	OX NO	
SAMPLES F	ROM	EXA	MINED BYW	. W. Sloan		
LOCATION	147½ di	ue SW of #1 Core Ho	ole ELEVATION	KB 6133	LOAN SET	2
FROM	то		FOR	MATION AND REMA	ARKS	
1730 1735 1740 1770 1790 1800 1880 1885 1890 1900 1915 1965 1965 1965 2000 2030 2030 2035 2065 2010 2125 2130 2145 2155 2160 2165 2160 2190	1735 1740 1770 1790 1800 1870 1880 1985 1995 1945 1965 1965 1965 2030 2030 2035 2065 2065 2110 2130 2145 2155 2160 2165 2180 2190	Oil shale, fair of As above woil shas above woil shale, good to Oil shale, good to Oil shale, good to Oil shale, good to Shale, gray block Core #0.  Oil shale, good to Oil shale, good to Oil shale, good to Shale, gray block Core #0.  Oil shale, good to Oil shale, good wo Shale, gray block Shale, gray block Shale, gray block Shale, gray block Shale, gray and goil shale, fair to Shale, gray green Shale, gray green Shale, gray green Shale, gray, sdy Shale, light gray Sandstone, vfg, shale, gray, mush Sandstone, vfg, shale, gray, mush Sandstone, fine growth oil depth, drill	to good w/inth to good w/inth to very good. to good w/inth n good. n good to very n good. n fair to good to very good w v/intbds of gr to very good w v/intbds of gr to very good. v/gray and gray ty w/some good ty w/gray green and ty w/gray green and to good w/gray gray green and to good w/sh gr ty, sh gray gr n and brown. (poor samples ty, sdy. silty w/gray s ty, sdy (poor silty w/musny gr, gray.	ods of brown ods of gray and gray and brown shown shown and gray brown ween and gray brown when and gray and gr	and gray sh and hid brown sh and sof gray sh. sh (papery). own sh (as about sh, w/some good own sh. e fair to good green. h w/some fair to	d some mudst.  d some mudst.  ve).

# COMPLETION REPORT

HUMBLE NO. 2 MILO LOVE CORE HOLE

W. W. Sloan Salt Lake City, Utah July 6, 1964

STRICTLY CONFIDENTIAL

SUMMARY

Well name:

Milo Love No. 2 Core Hole

Location:

531 1072 FSL, Sec 9-T2S-R97W, Rio Blanco County, Colorado (147.5 due SW of Milo Love No. 1

Core Hole)

Elevation:

Gr 6123 feet, KB 6133 feet

Total depth:

Schlumberger 2190 feet, driller 2,190 feet

Spud date:

May 31, 1964

Completed:

June 16, 1964

Hole size:

17% inches to 200 feet; 12% inches from 200 feet to

2,190 feet

Casing:

13-3/8 inches to 195 feet; 9-5/8 inches to 2,190 feet

Mud:

Saturated salt gel - Baroid

Footage cored:

237 feet

Number of cores:

8

Size of core:

5% inches

Logs:

Formation Density

Gamma Ray

Caliper

Continuous Directional

Contractor:

Willard Pease Drilling Company

# Tops

Alluvium	Surface
Evacuation Creek member of the Green River formation (sample and drilling time)	<b>70 (+</b> 6063)
Parachute Creek member of the Green River formation (sample and Formation Density log)	<b>3</b> 06 (+58 <i>2</i> 7)
Mahogany Marker (Formation Density log by correlation with Formation Density log and core Milo Love No. 1)	635 (+5498)
Garden Gulch member of the Green River formation (Formation Density log)	1802 (+4331)
Orange Marker (Formation Density log)	1971 (+4162)
Douglas Creek member of the Green River formation (Formation Density log)	2092 (+4141)
Total depth	2190 (+3943)

### Introduction

The Milo Love No. 2 Core Hole was drilled as an input well for in situ experiments. Cores were cut at selected intervals and drill cuttings were collected every five feet to provide geologic data for correlation and determining continuity of lithology. The discussion of general geologic information contained in the completion report for the Milo Love No. 1 Core Hole, located 147½ feet to the northeast, is applicable to both holes.

#### Correlation

Listed below are formation tops and selected points taken from the Formation Density logs of the Milo Love Core Holes, showing correlation and the relative structural position of the No. 2 hole to the No. 1 hole.

Note: Correlation of the Love No. 2 was made on the run calibrated 0 to 2000. The run calibrated 0 to 3000 is approximately one foot off above the depth 1350. Below this point the runs appear to be on equivalent depth.

	Milo Love No. 1	Milo Love No. 2	
Evacuation Creek Parachute Creek Correlation Point Mahogany Marker Correlation Point Correlation Point Correlation Point Correlation Point Garden Gulch	68 (+6062) 295 (+5835) 450 (+5680) 634 (+5496) 794 (+5336) 1069 (+5061) 1275 (+4855) 1527 (+4603) 1800 (+4330)	70 (+6063) 306 (+5827) 452 (+5681) 635 (+5498) 794 (+5339) 1071 (+5062) 1278 (+4855) 1529 (+4604) 1802 (+4331)	l' high 8' low l' high 2' high 3' high l' high flat l' high l' high
Orange Marker	1970 (+4160)	1971 (+4162) 2092 (+4041)	2' high
Douglas Creek	2090 (+4040)	2092 (+4041)	l' high

The table above shows the No. 2 Love to be structurally flat to three feet higher than the No. 2 with one exception, which is the top of the Parachute Creek member. This top is eight feet low due to erosional unconformity. On surface exposures the Evacuation Creek member has been observed filling channels cut as deeply as 100 feet into the Parachute Creek.

Correlation based on samples and cores is somewhat difficult due to the homogeneity of the section. It is believed, however, that a detailed examination of slabbed cores will disclose a number of local and regional correlation points. Geologists with the Shell Oil Company are preparing a guidebook paper in which they claim that they can correlate individual varves over distances as great as eight and one-half miles.

## Drilling operations

To best achieve the purpose of this well, the main requirements were for a straight hole (less than 1° deviation) with a smooth bore. In the upper part of the hole it appeared that this would be impossible; however, by drilling with very little weight and using several stabilizers on drill string, the objective was achieved.

The deviation was out to nearly 2° between 600 and 800 feet. It came back in to less than 1° between 1000 and 1100 feet and finally to practically zero from 1400 feet to total depth.

Erratic hole enlargements of as much as four inches were found in the upper 500 feet. However, from 1200 feet to total depth the bore was extremely smooth and regular.

Saturated salt gel mud was used instead of the inverted oil emulsion that was used on the No. 1 Love. This mud proved to be very satisfactory. It was easier to control and apparently had very little effect on the soluble minerals that are contained in the rocks of this area. Also, it was much easier to clean the core and recovery was just as good or better.

#### Coring operations

Seven 30-foot intervals and one 27-foot interval were cored for a total of 237 feet. Only six feet or 2.5% of the core was lost. This percentage of loss figure is identical to that of the Milo Love No. 1. The same two diamond coreheads that had cut 2058 feet of core in the No. 1 Love were reused and were still in excellent condition at the completion of this hole.